

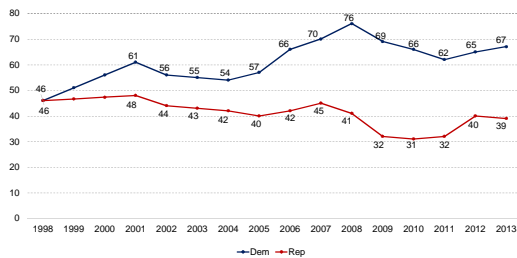
Cheap Talk and Climate Change: A Theory of Discordant Climate Change Policies

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Introduction

- Public perception of climate change in the U.S. by political party: effects of global warming, % have already begun to happen, Gallup Poll conducted 1998-2013.



- The successive IPCC reports have gained more scientific confidence in identifying humans as the cause of much of the recent warming (1st report 1990 - 5th report 2013).
- Climate scientists express a strong consensus that average surface temperatures have increased over the past 100 years and that it is caused primarily by human-induced emissions of GHGs (National Research Council, 2012)
- Why does there exist such governments or policy makers that deny the climate change warning from the majority of climate scientists?

A Game-theoretic Model

- We develop a game-theoretic model of the three parties associated with climate change in the socio-economic political context: the government, the climate scientist, and the median voter.
- We note that the messages from climate scientists, which are scientific reports on climate change, are not verifiable by governments (policy makers). Therefore, the messages themselves are talk-costless, nonbinding, and nonverifiable claims, which make the game a cheap-talk.
- Climate Scientist's payoff function:

$$U^S(r, \theta) = \theta \left[-(1 - \beta)y + 2b_S r - \frac{1}{y} r^2 \right] + (1 - \theta) \left[-(1 - \beta)y + (2 - \beta)r - \frac{1}{y} r^2 \right]$$

- Government's payoff function:

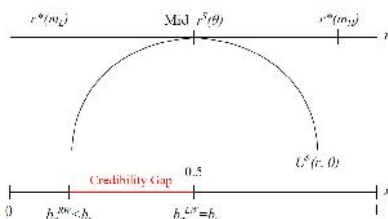
$$U^G(r, \theta) = \theta \left[-(1 - \beta)y + 2b_G r - \frac{1}{y} r^2 \right] + (1 - \theta) \left[-(1 - \beta)y + (2 - \beta)r - \frac{1}{y} r^2 \right]$$

- The climate scientist observes the probability of *Bad State* (θ) and then sends a message m_L if $\theta < x$ and m_H if $\theta > x$.
- There exists a partially separating equilibrium with a two-step if the following conditions are satisfied:

$$(1) x = \frac{1 - 0.5\beta - b_g}{2 - \beta + 2b_g - 4b_s};$$

$$(2) 1 - 0.5\beta < b_g < 2b_s - 1 + 0.5\beta.$$

- x is the threshold point that the climate scientist sends the message of high risk of climate change, and the government updates its belief about risk of climate change accordingly.



- The government with larger b_s is defined as the left wing.

- It creates a credibility gap between the climate scientist and the government if the preferences of the climate scientist get further away from the preferences of the government, and it results in smaller ex-post equilibrium quantities of clean energy if the climate scientist gets closer to the left wing.

- The change in the preference of the climate scientist does not affect the ex-ante expected clean energy.

- The median voter's payoff function is:

$$U^V(r, \theta) = \theta \left[-(1 - \beta)y + 2b_V r - \frac{1}{y} r^2 \right] + (1 - \theta) \left[-(1 - \beta)y + (2 - \beta)r - \frac{1}{y} r^2 \right]$$

- The ex-ante social welfare function is:

$$W(EU^S(r^*(m), \theta), EU^G(r^*(m), \theta), EU^V(r^*(m), \theta)) = \sum_{i \in \{S, G, V\}} EU^i(r^*(m), \theta)$$

where $EU^i(r^*(m), \theta)$

$$= q(m_L) \int_0^x U^i(r^*(m_L), \theta) \rho(\theta | m_L) d\theta + q(m_H) \int_x^1 U^i(r^*(m_H), \theta) \rho(\theta | m_H) d\theta$$

- The ex-ante social welfare is maximized when the information on the risk of climate change is perfectly transmitted from the scientist to the government. The perfect information transmission is achieved only if the climate scientist has identical preference with the government, so that $x=0.5$.
- If we allow the government to assign its climate scientist, then the government will choose the climate scientist who has identical preference with itself. Thus it achieves the perfect information transmission and the maximized ex-ante social welfare.
- The government cannot assign a climate scientist with identical preference when it has election concerns with respect to climate change policies. If the government assigns a more left (right) wing climate scientist so that $x < 0.5$ ($x > 0.5$), then the ex-post equilibrium quantities of clean energy are smaller (larger) than in the equilibrium without election concerns.
- The government has an incentive to deviate from $r^*(m_L)$ to $r^*(m_H)$ but not in the opposite direction, when the voters do not observe the message and the government assigns a more left wing climate scientist so that $x < 0.5$. The government has an incentive to deviate from $r^*(m_H)$ to $r^*(m_L)$ but not in the opposite direction, when the voters do not observe the message and the government assigns a more right wing climate scientist so that $x > 0.5$.

Conclusions

- Our model shows that it creates a credibility gap between the climate scientist and the government if the preferences of the climate scientist get further away from the preferences of the government, and it results in smaller ex-post equilibrium quantities of clean energy if the climate scientist gets closer to the left wing.
- We cannot expect any change in the ex-ante expected quantity of clean energy as the preference of the climate scientist changes.
- The information on the risk of climate change is perfectly transmitted only if the climate scientist has identical preference with the government; and in that case only, the ex-ante social welfare is maximized.
- It is not obvious that more political competitiveness and participation regarding climate change lead the government to take more precautionary actions against climate change in our model.
- However, we show that the climate change policy may not be adjustable to the scientific reports on the risk of climate change if voters do not observe the message from the climate scientist.

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